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Rhodora

JOURNAL OF THE

NEW ENGLAND BOTANICAL CLUB

Conducted and published for the Club, by

MERRITT LYNDON FERNALD, Editor-in-Chief

CHARLES ALFRED WEATHERBY
ALBERT FREDERICK HILL
STUART KIMBALL HARRIS
} Associate Editors

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The New England Botanical Club, Inc.

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Botanical Museum, Oxford St., Cambridge 38, Mass.

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Vol. 48. December, 1946. No. 576.

THE GENUS LIATRIS

L. O. Gaiser

(*Continued from page 383*)

Series X. Squarrosae. Plants of intermediate height, 3–6 dm. tall, with from few racemiform to more branched cymiform inflorescence-stalks; heads large, 25–40-flowered, broadly cylindrical to isodiametric, often with foliaceous phyllaries loosely erect and out-spreading, becoming squarrose-tipped in the majority of the varieties; achenes 5–6 mm. long. 32. *L. squarrosa.*

From Delaware to Tennessee, south to the Gulf of Mexico and west of the Mississippi through the central and western plains states to the Kansas-Colorado border and northward into South Dakota.

32. Liatris squarrosa (L.) Michx. Plants 3–6 dm. high from a rounded corm up to 4 cm. in diameter, with several to numerous stems, glabrous, soft-pubescent or hairy; leaves linear and rigid, punctate, glabrous or hirsute the radical sometimes very long, 15–25 cm. long, 4–7 mm. wide, the cauline 10–15 cm. long; inflorescence with one to few heads and raceme-like, or with many heads, branched and paniculate: heads almost isodiametric or elongate, 1.5–3 cm. long, 25–40-flowered (terminal ones frequently greatly exceeding the rest, up to 60-flowered), varying in width according to the spread of the phyllaries, sessile or on short pedicels; phyllaries foliaceous, glabrous or hirsute, ciliate-membranous or callose-margined, the inner in all varieties narrowly linear with acute tips, 1.5–2 cm. long and 1–2 mm. wide; outer ones elongate, triangular-lanceolate, often like reduced leaves, ciliate-margined; middle ones similar, acuminate and spreading, or broader, more closely appressed basally, mucronate and squarrose at the tip; corolla phlox-purple, 9–15 mm. long; inner surface of corolla-lobes conspicuously hairy; outer flowers of the head tending to be bent outwards approximately at mid-corolla length, thus giving the heads a broad, flat

top; stigmas sometimes white; achene 5–6 mm. long; pappus 7–12 cm. long.—Fl. Bor.-Am. ii. 92 (1803); Willd. Sp. Pl. iii. 1634 (1803); Pursh, Fl. Am. Sept. ii. 509 (1814); Torr. & Gray, Fl. N. Am. ii. 68 (1841), excl. var. δ; Gray, Synopt. Fl. i². 109 (1884), excl. var. *intermedia*. *Serratula squarrosa* L. Sp. Pl. 818 (1753). *Pteronia caroliniana* Walt. Fl. Carol. 202 (1788). *Laciniaria squarrosa* (L.) Hill, Veg. Syst. iv. 49, t. 46, fig. 1 (1762).

Key to Varieties

a. Stem, leaves and phyllaries with varying degrees of pubescence . . . b.
  b. Phyllaries long . . . c.
    c. Outer phyllaries acuminate, ciliate-margined, squarrose or spreading and leafy, middle and inner ones membranous-margined and squarrose or merely spreading; plants hispidulous with short, whitish hairs . . . d.
      d. Plants stout and much-branched, with numerous large, almost isodiametric, thick heads; phyllaries mostly squarrose . . . . . var. *typica*.
      d. Plants of one or a few slender stems, bearing few, longer, more cylindrical heads . . . . . var. *gracilenta*.
  b. Phyllaries short . . . e.
    e. Outer phyllaries acute, with or without ciliate margins, middle and inner ones acute, usually callose-margined and squarrose; heads cylindrical and variable in size var. *alabamensis*.
    e. Outer phyllaries a few, short, acute bracts, not foliaceous, middle ones appressed and abruptly mucronate into a definite cusp, squarrose and long-ciliate; heads small, neatly cylindrical; plants hirsute with longer tawny hairs; leaves narrowly linear . . . . . var. *hirsuta*.
a. Stem, leaves, and phyllaries glabrous . . . f.
  f. Head surrounded by spreading, non-recurved, leaf-like bracts exceeding the length of the head; outer phyllaries acuminate, erect, middle and inner ones similarly elongate, linear, non-cuspidate, erect or spreading; heads sessile, frequently only a terminal one developing on a stem . . . . . var. *compacta*.
  f. Heads lacking conspicuous, long, foliaceous outer bracts; outer phyllaries acute, squarrose or spreading, middle and inner ones narrow, callose-margined, cuspidate and recurved; heads on short pedicels and numerous . . . . . var. *glabrata*.

Var. **typica.** Plants with dense, short, white hairs covering the stem and frequently both or only the lower surface of the generally 3–8-veined leaves, though leaves sometimes are quite glabrous; numerous heads on peduncles of various lengths giving the appearance often of a much-branched and "floribund" plant; outermost phyllaries leaf-like and spreading, narrowly lanceolate and hardly overlapping, frequently covered by and always fringed with white hairs; middle phyllaries lanceolate, pubescent or glabrous, sometimes membranous-margined, more frequently ciliate, closely imbricated, the long acuminate or mucronate tips (that in the outer ones decrease from one half to one quarter the length of the bract) sometimes becoming somewhat involute and

squarrose so that the over-all measurements of a head are almost the dimensions of a square; heads average 1.8 x 1.6 cm., 25–40-flowered; corolla ca. 15 mm. long, pappus 12 mm. long.—*Liatris squarrosa* β *floribunda* Torr. & Gray Fl. N. Am. ii. 68 (1841). *Liatris squarrosa* R. Sweet, Br. Fl. Gard. 2 ser. t. 44 (1823). *Vernonia hirsutiflora* Poiret, Encyc. Meth. Bot. viii. 502 (1808). *Liatris hirsutiflora* Kostel. Allg. Med. Pharm. Fl. ii. 651 (1833).

Delaware to northern Florida, westward to Alabama, Illinois and Missouri.—SOUTHERN STATES. Without stated locality: ex *Michx. Herb.* (NY). DELAWARE. NEWCASTLE Co.: Wilmington, *W. M. Canby* (G). DISTRICT OF COLUMBIA. Without stated locality: July 29, 1893, *L. F. Ward* (US). MARYLAND. QUEEN ANNES Co.: by roadside, near Centreville, Aug. 11, 1935, *H. A. Allard*, 834 (G, NY). PRINCE GEORGES Co.: Brooks Sta., Aug. 2, 1885, *Prof. Ward* (US). CHARLES Co.: Stump Neck, Aug. 6, 1942, *J. M. Turpin*, 475 (US). VIRGINIA. Without stated locality: 1878, *Dr. Foreman* (US). FAIRFAX Co.: in a field, n. side of Accotink Bay, Aug. 8, 1893, *L. F. Ward* (US); wooded hills of New Alexandria, Aug. 10, 1919, *E. C. Leonard*, 776 (US). PRINCE WILLIAM Co.: Manassas, Sept. 18, 1907, *E. S. Steele* (US). FAUQUIER Co.: Catletts, Aug. 1, 1908, *Mrs. E. S. Steele* (US). HENRICO Co.: dry sandy field, Westover Hills, July 21, 1936, *M. L. Fernald & B. Long*, 6415 (G, NY, US); near Richmond, July 19, 1935, *E. Luttrell*, 5679 (G); dry open pine woods, ¼ mi. w. of Elko, Aug. 8, 1921 (G), Aug. 16, 1921 (NY) *E. J. Grimes*, 4195 (G, NY); sandy oak and pine lands, Elko, Aug. 30, 1925, *E. T. Wherry & F. W. Pennell*, 12528 (NY); Whiteoak Swamp, w. of Elko, July 23, 1938, *M. L. Fernald & B. Long*, 8872 (G). PRINCE GEORGE Co.: s. of Petersburg, July 22, 1936, *M. L. Fernald & B. Long*, 6416 (NY). CAMPBELL Co.: without stated locality, July 1893, *A. A. Heller* (G); Lynchburg, July 19, 1925, *W. A. Murrill* (F). BEDFORD Co.: roadside near Huddleston, Aug. 9, 1914, *Miss J. Fauntleroy*, 653 (US), Aug. 4, 1871, *A. H. Curtiss* ((G, plant to left), NY, Q). DINWIDDIE Co.: dry, open, border of argillaceous woods, s. of Petersburg, July 15, 1938, *M. L. Fernald & B. Long*, 8871 (G). PRINCE EDWARD Co.: without stated locality, Aug. 25, 1880, *J. D. Smith* (US), Sept. 1885, *Prof. Blair*, 317 (US). PITTSYLVANIA Co.: Fall Creek, July 20, 1893, *A. A. Heller*, 1111 (G, NY, US). GREENSVILLE Co.: old fields, vicinity of Belfield, July 1, 1904, *O. M. Meyncke* (US); Sprouse's Corners, Aug. 17, 1936, *Bartley & Pontius*, 540 (NY). MECKLENBURG Co.: Finchley, Aug. 20–22, 1908, *W. W. Eggleston*, 4010 (G, NY, US). WEST VIRGINIA. CABELL Co.: Roland Park, near Huntington, July 23, 1937, *F. A. Gilbert*, 988 (G, NY); dry open field near Huntington, Sept. 20, 1931, *F. A. Gilbert*, 198 (G); dry field in clay soil, Roland Park, near Huntington, July 24, 1940, *F. A.*

Gilbert, 132 & 156 (NY, F without no.). NORTH CAROLINA. Granville Co.: Hester, July 23, 1937, *R. K. Godfrey* (G). Caswell Co.: roadside, 10 mis. n. of Yanceyville, July 31, 1938, *R. K. Godfrey*, 5592 (G). Guilford Co.: Greensboro, Aug. 14, 1903, *Biltmore Herb.*, 580j (US). Forsyth Co.: open woods, Winston Salem, Aug. 1, 1921, *P. O. Schallert* (G). Moore Co.: Pinehurst, Aug. 1897, *O. Katzenstein* (G). Gaston Co.: Crowder's Mt., July 29, 1902, *Biltmore Herb.*, 580h (US). Cleveland Co.: King's Mt., Aug. 27–30, 1884, *J. K. Small* (NY): slopes of King's Mt., July 1896, *J. K. Small* (NY). Scotland Co.: sandhill, 12 mis. north of Laurinburg, July 14, 1938, *R. K. Godfrey*, 5040 (G). New Hanover Co.: sand ridge at Carolina Beach, Aug. 7, 1938, *R. K. Godfrey*, 5906 (G). SOUTH CAROLINA. Lexington Co.: Columbia, *Gibbes* (G). Georgetown Co.: sandy woods, 3½ mis. s. of Georgetown, July 21, 1939, *R. K. Godfrey & R. M. Tryon*, 794 (G, NY). Aiken Co.: sand hills, Aiken, July 17, 1900, *Biltmore Herb.* 580d (US) and July 22, 1905, *Biltmore Herb.*, 580p (US). Charleston Co.: sandy place, McClellanville, Sept. 2, 1940, *P. O. Schallert* (G). Beaufort Co.: Beaufort district, 1883, *J. H. Mellichamp* (US). GEORGIA. Walker Co.: dry soil, open woodlands, Chickamauga Park, July 14, 1899, *Biltmore Herb.*, 580c (US). Bibb Co.: dry soil, Macon, July 31, 1901, *Biltmore Herb.*, 580g (US). Richmond Co.: dry oak woods, Augusta, July 31, 1898, *A. Cuthbert* (NY, US, F). FLORIDA. Gadsden Co.: pinelands, River Junction, Aug. 31, 1901, *Biltmore Herb.*, 580f (US). OHIO. Without stated locality: 1834, *Riddell* (G, NY). Erie Co.: cemetery, Castalia, July 21, 1895, *E. L. Moseley* (G, US). Lucas Co.: oak openings, n. e. of Neapolis, Aug. 26, 1927, *E. L. Moseley* (US). Adams Co.: without stated locality, July 27, 1940, *D. M. Brown* (NY). INDIANA. Clarke Co.: dry open knobs, July 30, 1909, *C. C. Deam*, 5408 (NY). KENTUCKY. Meade Co.: near Brandenburg, Aug. 9, 1928, *W. A. Anderson* (G). Calloway Co.: dry field, between Murray and New Concord, July 20, 1937, *L. B. Smith & A. R. Hodgdon*, 4089 (G, NY, US). TENNESSEE. Without stated locality: 1870, *G. R. Vasey* (US). Grainger Co.: Clinch Mt., Aug. 12, 1880, *J. D. Smith* (US). Cheatham Co.: dry shale banks, Pegram, Aug. 20, 1940, *H. K. Svenson*, 10607 (B). Knox Co.: open ground, near Knoxville, July 12, 1900, *A. Ruth*, 41 (G); dry sandy soil, Knoxville, June 1896, *A. Ruth*, 37 (NY); sandy ground, Knoxville, June 1897, *A. Ruth*, 3772 (NY); mt. sides, Smoky Mt. Range, Sept. 1897, *A. Ruth*, 3773 (NY); Knoxville, June 1898, *A. Ruth*, 659 (US); dry ground, Aug. 1898, *A. Ruth*, 676 (NY); near Young's High School, Knoxville, Aug. 2, 1934, *M. B. Wilson*, 2968 (NY). Roane Co.: Harriman, Aug. 18, 1909, *Biltmore Herb.*, 580i (US). Grundy Co.: near Monteagle, Sept. 23,

1933, *E. J. Alexander, T. H. Everett, S. D. Pearson* (NY). ALABAMA. Co. undetermined: dry sandy pine ridges (two plants to right), Sept. 1878, *C. Mohr* (US). Barbour Co.: dry oakwoods-border, 8 mis. s. of Eufaula, Aug. 11, 1927, *K. M. Wiegand & W. E. Manning*, 3177 (G). Escambia Co.: high pineland, Atmore, July 11, 1934, *O. Blanton*, 193 (US). Mobile Co.: pine barrens, w. of Spring Hill, Aug. 1918, *E. W. Graves*, 589 (G); pine barrens, July 1918, *E. W. Graves*, 558b (US). ILLINOIS. Co. undetermined: south Illinois, *G. Vasey*, 1210 (G). Richland Co.: Olney, July 29, 1914, *R. Ridgway*, 91 (G); near Olney, Sept. 6, 1914, *R. Ridgway* (G). Marion Co.: without stated locality, *M. S. Bebb* (G). Perry Co.: Du Quoin, Aug. 4, 1893, *H. Eggert* (NY, US); prairies, Aug. 4, 1893, *H. Eggert* (US). MISSOURI. Stoddard Co.: Bernie, Aug. 2, 1895, *B. F. Bush*, 235 (NY).

Var. **gracilenta,** var. nov., molliter pubescens vel rarius fere glabra gracilis; caulibus singulis vel paucis raro ramosis capitula sessilia vel subsessilia plerumque 1–5 gerentibus; foliis plerumque longis angustisque, radicalibus ad 25 cm. longis 4 mm. latis; capitulis elongatis cylindricis plerumque 1.9 cm. longis 1.2 cm. latis ca. 25-floris; phyllariis longe lanceolato-acuminatis apice laxe patentibus nec recurvatis, exterioribus 1–1.5 cm. longis 2 mm. latis, medianis 2 cm. longis basi apicis subspathulati 4–5 mm. latis; corollae tubo ca. 15 mm. longo; pappo 12 mm. longo.—Verisimiliter *L. squarrosa* sensu Ell. Sk. ii. 282 (1822?).

Type from Ocean Springs, Jackson Co., Mississippi, Aug. 11, 1895, *J. S. Skehan* (G).

Mostly from south Georgia, Florida, Alabama, Mississippi and Louisiana.—Without stated locality:[1] *Drummond*, 172 "A. & L." (G). VIRGINIA. Bedford Co.: without stated locality: Aug. 4, 1871, *A. H. Curtiss* (plant to right) (G). NORTH CAROLINA. Madison Co.: Marshall, French Broad River, Aug. 7, 1880, *J. D. Smith* (US); Hot Springs, Aug. 13, 1888, *B. W. Evermann* (US, 617885 and 310560). Buncombe Co.: dry soil, Biltmore, July 30, 1897, *Biltmore Herb.*, 580a (G, NY, US 332424 and 959080); Biltmore, Aug. 1894, *Biltmore Herb.*, 580 (US, 959081); Cedar Cliff Mt., Aug. 17, 1904, *Biltmore Herb.* 580m (US). GEORGIA. Walker Co.: dry soil, open woodlands, Chickamauga Park, July 14, 1899, *Biltmore Herb.*, 580c (US). Floyd Co.: Lavender Mt., Rome, Aug. Herb. Chapman (US). Gwinnett Co.: Banks of Yellow R., July 20, 1893, *J. K. Small* (G). FLORIDA. Without stated locality: *Chapman* (NY, US). Washington Co.: dry rolling pine barrens, near Chipley, July 28, 1901, *A. H. Curtiss* 6849 (G, NY, US, Q). KENTUCKY. Co. undetermined: barrens of Kentucky, July

[1] Though probably from Covington, La. (see footnote under discussion of this species).

1837, *C. W. Short* (G). ALABAMA. Co. undetermined: dry sandy pine ridges (one plant to left), Sept. 1878, *C. Mohr* (G). Co. undetermined: dry sandy pine ridges (one plant to left), Sept. 1878, *C. Mohr* (US). WASHINGTON Co.: low pine barrens (one plant to right) June 15, 1895, *C. Mohr* (US). MISSISSIPPI. COPIAH Co.: 2 mis. s. of Hazelhurst, July 14, 1925, *F. Cook* (US). JACKSON Co.: Ocean Springs, Aug. 11, 1895, *J. Skehan* 1353 (G, type); Ocean Springs, July 27, 1896, *C. L. Pollard*, 1082 (US); Biloxi, Sept. 4, 1900, *S. M. Tracy*, 487 (NY). HARRISON Co.: sandy pineland, 1 mi. e. of Mississippi City, Aug. 27, 1912, *F. W. Pennell*, 4347 (NY, US); grassy pine barrens, near Mississippi City, Sept. 15, 1885, *J. D. Smith* 424 (US). MISSOURI. BUTLER Co.: Malden, Aug. 21, 1894, *B. F. Bush* 386 (G, NY). GREENE Co.: dry rocky woods, Aug. 6, 1895, *J. W. Blankinship* (G). LOUISIANA. Without stated locality: *ex Herb. C. W. Short, Mr. Steinhauer* (G). NATCHITOCHES Co.: Natchez, *C. Wright* (G). RAPIDES Co.: pinelands, Sept. 10, 1900, *Biltmore Herb.*, 580e (two outermost plants) (US). TANGIPAHOA Co.: dry soil, s. of Hammond, June 20, 1938, *D. S. Correll & H. B. Correll*, 9255 (G, NY). ST. TAMMANY Co.: vicinity of Covington, Aug. 20, 1920, *Bro. G. Arsène*, 12614 (US); vicinity of Covington, July 1919, *Bro. G. Arsène*, 11665 (US); Covington, 1832, *Drummond* (NY). TEXAS. JACKSON Co.: 4 mis. n. of Edna, July 1935, *J. A. Drushel*, 10339 (NY). NEWTON Co.: without stated locality, July 23, 1939, *B. C. Tharp* (G).

Var. **alabamensis** (Alex.), comb. nov. Plants that appear to be intermediate between varieties *gracilenta* and *glabrata*, with stems and leaves and outer phyllaries glabrous or softly pubescent; outer phyllaries spreading or slightly squarrose, triangular-lanceolate-acuminate 5–8 mm. long and 3–5 mm. wide and ciliate-margined; middle phyllaries glabrous, more sharply pointed and cellose-margined, 1–1.5 cm. long and 5 mm. wide; heads from 1.5–2 cm. long and 1–1.5 cm. wide, of about 30 flowers; corolla 10–12 mm. long; pappus ca. 1 cm. long.—*Laciniaria squarrosa alabamensis* Alex. ex Small Man. S. E. Fl. 1333 (1933) without indication of status.

Alabama, Mississippi, Louisiana and eastern Texas.—ALABAMA. HALE Co.: dry chalk prairies, ½ mi. w. n. w. of Rosemary, Aug. 23, 1934, *R. M. Harper*, 3252 (G, NY, US); chalk prairies, 5 mis. s. of Newbern, Aug. 1, 1938, *H. K. Svenson & R. M. Harper* 9801 (G). LEE Co.: Auburn, Aug. 11, 1897, *F. S. Earle & C. F. Baker*, 1344 (NY, type). ESCAMBIA Co.: high pineland, Atmore, July 11, 1934, *O. Blanton*, 183 (G). MISSISSIPPI. OKTIBBEHA Co.: Agric. College, 1896, *C. L. Pollard*, 1318 (G, NY (US, plant to left)). JACKSON Co.: Ocean Springs, July 27, 1896, *C. L. Pollard*, 1082 (NY, US); Sept. 1, 1891, *A. B. Seymour*, 193 (G); Biloxi, *S. M. Tracy*, July 31, 1900, 4334 (G),

Aug. 31, 1900, 9734 (US); Aug. 23, 1898, 4335 (NY, US). LOUISIANA. Without stated locality: *ex Herb. G. Thurber, S. T. Olney* (G). Rapides Co.: pinelands (centre plant), Sept. 10, 1900, *Biltmore Herb.*, 580e (US). Jefferson Davis Co.: low prairies, Welsh, Sept. 10, 1915, *E. J. Palmer*, 8484 (US). TEXAS. Polk Co.: dry upland woods, Livingston, Sept. 19, 1917, *E. J. Palmer*, 12802 (US). Walker Co.: without stated locality, Aug. 1, 1937, *B. C. Tharp* (G). Brazos Co.: Bryan, Aug. 17, 1903, *Biltmore Herb.*, 580i (US); College Station, 1888, *Herb. Boston, Soc. Nat. Hist., Mr. P* (G). Washington Co.: without stated locality, Aug. 1, 1938, *Miss E. Brackett* (G). Bastrop Co.: clay banks, Bestrop, 1930, *H. H. Duval*, 24 (G); without stated locality, Aug. 22, 1941, *B. C. Tharp*, 188 (G). Harris Co.: Houston, 1842, *Lindheimer* (G). DeWitt Co.: without stated locality, July 5, 1942, *B. C. Tharp* (G); western DeWitt, July 25, 1941, *Miss M. Riedel* (G). Fayette Co.: near Schulenberg, Aug. 2, 1935, *H. B. Parks*, 14559 (G). Galveston Co.: Kemah, Sept. 6, 1926, *G. L. Fisher*, 261 (US).

Var. **hirsuta** Rydb. Plants with hirsute stems and hirsute, narrow, 1–3-veined leaves and long-ciliate-margined phyllaries; few outermost phyllaries may be narrowly lanceolate but most are broadly oblong, narrowing abruptly into long cusp-like tips that alone are strongly reflexed giving the head of ca. 20 flowers a more compact, narrow, cylindrical appearance, averaging 1.3 x 1 cm.; outer phyllaries 0.7–1 cm. long and 4–5 mm. wide; middle ones 1–1.3 cm. long and 3–4 mm. wide; corolla ca. 1 cm. long; pappus 8 mm. long.—*Liatris hirsuta* Rydb. Brittonia i. 98 (1931). *L. squarrosa* var. *hirsuta* Rydb. l. c. 99 in synon.; here accepted and validated. *L. squarrosa hirsuta* (Rydb.) F. C. Gates, Trans. Kans. Acad. Sci. xlii. 138 (1940), without indication of status.

Chiefly west of the Mississippi in the Ozarks of Missouri and the western mountainous regions of Arkansas; also in eastern Kansas and Oklahoma.—KENTUCKY. Co. undetermined: barrens of Kentucky, July 1871, *W. M. Canby* (G). MISSISSIPPI. Holmes Co.: without stated locality, Aug. 10, 1893, *S. M. Tracy* (NY). IOWA. Palo Alto Co.: high prairie hilltop, s. of Virgin Lake, Highland Twsp., Sect. 30, Sept. 16, 1937, *Miss A. Hayden*, 10533 (G, NY). MISSOURI. Mercer Co.: dry open woods, 5 mis. s. w. of Linesville, July 5, 1933, *E. J. Palmer & J. A. Steyermark*, 41312 (NY, US). Adair Co.: dry banks, open woods, 4 mis. n. of Kirksville, July 3, 1933, *E. J. Palmer & J. A. Steyermark*, 41174 (NY). Jackson Co.: prairies, Lee's Summit, July 25, 1905, *B. F. Bush*, 3096a (G, NY, US); Little Blue, July 22, 1896, *B. F. Bush*, 454 (US); dry hills, e. of Dodson, July 26, 1896, *K. K. Mackenzie* (NY). Cass Co.: barrens, west of Belton, Aug. 4, 1902, *K. K. MacKenzie*, 97 (US,

NY). Vernon Co.: dry banks, border of woods, along creek near Nevada, Aug. 6, 1933, *E. J. Palmer & J. A. Steyermark* 42138 (US, NY). Polk Co.: vicinity of Graydon Springs, Sept. 7, 1912, *P. C. Standley*, 9909 (US); on top of cherty lime barren, on steep slopes along Pomme de Terre R., 2 mis. n. e. of Rondo, Aug. 1, 1937, *J. A. Steyermark*, 24097 (NY). Greene Co.: vicinity of Willard, Aug. 30, 1912, *P. C. Standley*, 9665 (US); dry ground, Sept. 4, 1893, *B. F. Bush*, 197 (NY); Springfield, 1888, *J. W. Blankinship* (US); along Rwy., n. e. of town, vicinity of Springfield, Sept. 1, 1921, *P. C. Standley*, 8622 (G, US). Jasper Co.: rocky open ground, n. fork of Spring River, near Neck City, Sept. 21, 1923, *E. J. Palmer*, 23863 (NY); high prairies, Sarcoxie, July 15, 1914, *E. J. Palmer*, 6261 (US). Barry Co.: Purdy, Aug. 17, 1905, *B. F. Bush*, 3254 (G, NY); Shell Mound, July 11, 1927, *E. J. Palmer*, 3244 (NY); Hailey, Sept. 15, 1905, *J. W. Phillips* (US); rocky slopes, open woods, near Seligman, Oct. 24, 1925, *E. J. Palmer*, 29370 (G); woods, Eagle Rock, Aug. 11, 1905, *B. F. Bush*, 3217 (G, NY, US). Newton Co.: along chert bluffs of Shoal Creek, near Redding's Mill, July 14, 1927, *E. J. Palmer*, 32505 (NY, type); Joplin, Sept. 8, 1912, *E. J. Palmer*, 3836 (NY, US). Taney Co.: rocky woods, Swan, Sept. 27, 1905, *B. F. Bush*, 3467 (G). McDonald Co.: dry ground, *B. F. Bush*, July 24, 1893, 200A (G), Sept. 1, 1893, 200B (US). ARKANSAS. Co. undetermined: Red River, *ex Torrey Herb., Dr. Pitcher* (NY); n. w. Arkansas, Sept., *F. L. Harvey*, 14 (G). Carroll Co.: dry hillsides, Eureka Springs, Sept. 30, 1913, *E. J. Palmer*, 4531 (US). Pulaski Co.: dry ledges, open woods, w. of Pulaski Heights, Little Rock, Sept. 21, 1931, *D. Demaree*, 8219 (G, NY); near Little Rock, *G. W. Letterman* (NY). Yell Co.: dry soil, Mt. Nebo, Aug. 4, 1903, *Biltmore Herb.*, 580k (US). Garland Co.: open dry woods, end of Whitington Ave., Hot Springs, Aug. 25, 1935, *F. J. Scully*, 461, 462 (G); open woods, Glenwood Road, 8 mis. from Hot Springs, July 21, 1935, *F. J. Scully*, 386 (G); near Hot Springs, 1928, *R. Runyon*, 1179a (NY). LOUISIANA. Natchitoches Co.: dry sandy hills, 3 mis. s. of Coldwater, July 26, 1938, *D. S. Correll & H. B. Correll* 9811 (G, NY); sandy open woods, Oct. 9, 1915, *E. J. Palmer*, 8800 (US). NEBRASKA. Co. undetermined: prairies, Aug. 4, 1853, *T. E. Hayden* (NY). KANSAS. Co. undetermined: Wolf Creek to Independence Creek, July 30, 1849, *A. Fendler* (G). Atchison Co.: prairie, 12 mis. w. of Atchison, July 18, 1936, *Sister Jeanette*, 150 (NY). Riley Co.: Manhattan, Aug. 9, 1892, *J. B. S. Norton* (US). Douglas Co.: without stated locality, Aug. 1870, *L. H. Hoysradt* (NY). Montgomery Co.: Caney, open dry banks, July 21, 1933, *E. J. Palmer*, 41795 (NY). OKLAHOMA. Co. undetermined: Sans

Bois Mts., Aug. 1891, *C. S. Sheldon*, 304 (US); prairies,[1] Aug. 26, 1853, *Lieut. A. W. Whipple's Exped., J. M. Bigelow* (US); Camp no. 4, N. W. Agency[1], July 28, 1853, *Bigelow* (NY); Camp no. 4[1], July 28, 1853, *Bigelow*, 357 (NY). Nowata Co.: on dry hilltop, Lenapah, Aug. 19, 1913, *G. W. Stevens*, 2175 (G, US). Cherokee Co.: dry rocky woodlands, Aug. 18, 1895, *J. W. Blankinship* (G, US). Le Flore Co.: Cavanal Mt., Poteau, Oct. 28, 1915, *E. J. Palmer*, 9059 (US). Pushmataha Co.: sandy meadow, Tuskahoma, June 20, 1937, *U. T. Waterfall* (NY).

Var. compacta Torr. & Gray. Glabrous plants with shining narrowly linear, leaves 2–3 mm. (occasionally up to 1 cm.) wide; heads of 20–40 flowers, generally sessile, generally borne singly and terminally on the stems, surrounded by long foliaceous bracts twice the length of the head, 5 cm. long, 2–4 mm. wide; phyllaries all completely glabrous, leaf-like, elongate, acuminate to cuspidate and spreading, but not squarrose at any time: outer ones 1–2 cm. long and 4 mm. wide; middle ones linear, 1.5–2 cm. long and 2–3 mm. wide; corolla ca. 1 cm. long; pappus 7–8 mm. long.—Fl. N. Am. ii. 68 (1841). *Liatris compacta* Rydb., Brittonia i. 98 (1931).

Observed from Arkansas only.—County undetermined: *Dr. Leavenworth* (G, NY, type. Perhaps from Louisiana). Pulaski Co.: Little Rock, Sept. 30, 1931, *D. Demaree*, 8338 (US). Garland Co.: Hot Springs, novaculite outcrops, slopes of Hot Springs Mt., Oct. 9, 1925, *E. J. Palmer*, 29057 (NY), rocky top of West Mt., June 4, 1923, *Palmer* 23061, grassy patches on novaculite rubble slope, June 18, 1933, *H. R. Gregg*, 38 (US), 1931, *R. Runyon*, 1442 (US), dry sandstone hills, July, 1880, *F. L. Harvey*, 42 (G), dry, rocky ground, slopes of West Mt., Oct. 15, 1925, *Palmer*, 29230 (NY); rocky bluff, Camp Charlton, Crystal Springs, June 14, 1942, *Demaree*, 23215 (G). Hot Spring Co.: rocky bluffs, Magnet Cove, May 1, 1938, *Demaree*, 17252 (G, NY).

Var. **glabrata** (Rydb.), comb. nov. Plants entirely glabrous with rigid narrow 1–3-veined leaves and phyllaries narrower than in var. *hirsuta*, short, acuminate, or cuspidate, callose-margined, and recurved after flowers have opened though they may be quite erect before that time; outer ones triangular-lanceolate, 0.7–1 cm. long; middle ones 1–1.5 cm. long and 4 mm. wide: heads trim, without the long foliaceous outermost bracts of vars. *compacta* and *typica*, averaging 1.3 x 1 cm., of 20–30 flowers; corolla ca. 1 cm. long; pappus 7–8 mm. long.—*Liatris glabrata* Rydb. Brittonia i. 98 (1931). *L. squarrosa glabrata* (Rydb.) F. C.

[1] According to Bigelow—Report on Lieut. Whipple's Expedition (1857) p. 96, Sect. 4, *L. squarrosa* was said to have been found on the prairies, August 26. From the map and notes the party followed the Canadian River, practically all of which lies in Oklahoma.

Gates, Trans. Kans. Sci. xlii. 138 (1940) without indication of status.

In the plains-states, South Dakota to Texas, west to the Colorado border of Kansas and east to Missouri.—MISSOURI. Greene Co.: dry rocky woods, Aug. 7, 1895, *J. W. Blankinship* (G); prairies, n. e. of Springfield, Aug. 21, 1912, *P. C. Standley*, 9113 (US). ARKANSAS. Barton Co.: Plum Buttes on Arkansas R., near Great Bend,[1] 1846, *Lieut. Abert's Exped.* (NY). SOUTH DAKOTA. Stanley Co.: banks of Mo., below Fort Pierre, 1853, *F. V. Hayden* (NY). Todd Co.: high land, Rosebud Creek, July 2, 1896, *E. J. Wallace* (NY); Rosebud, *E. J. Wallace* (US). Bennett Co.: sandhills, near La Creek P. O., Aug. 12, 1911, *S. S. Visher*, 2232 (NY). NEBRASKA. Co. undetermined: Platte R., near the Forks, *Herb. G. Thurber, H. Engelmann* (G); Platte R.,[2] *Lieut. Fremont* (G, NY). Knox Co.: Pisheville, Aug. 18, 1893, *F. Clements*, 2734 (G, NY, US); Fort Niobrara, June 25, 1888, *T. E. Wilcox* (NY); Niobrara Game Reserve, near Valentine, July 22, 1936, *W. L. Tolstead*, 527 (G). Keyapaha Co.: Cuba, 1908, *J. S. Haller* (US). Rock Co.: without stated locality, Aug. 26, 1890, *C. Rutter* (US). Brown Co.: Long Pine, *G. D. Swezey*, 52 (NY). Thomas Co.: near Plummer Ford, Dismal River, Aug. 23, 1893, *P. A. Rydberg*, 1505 (G, (NY, type), US)). Grant Co.: lake region, 4 mis. n. e. of Whitman, 1893, *P. A. Rydberg*, 1505 (G, NY). Custer Co.: Callaway, Aug. 17, 1902, *J. M. Bates* (G). Buffalo Co.: Fort Kearney, Platte R., 1856, *H. Engelmann* (G). KANSAS. Pottawatomie Co.: without stated locality, Sept. 1, 1892, *S. Norton* (NY). Riley Co.: low woods, Aug. 9, 1895, *J. B. Norton*, 278 (G); prairie, July 18, 1895, *J. B. Norton*, 212 (US). Geary Co.: Fort Riley, July 20, 1892, *E. E. Gayle*, 542 (NY). Ellsworth Co.: near Ellsworth, Aug. 2, 1930, *E. J. Palmer*, 38167 (G, US). Finney Co.: 2 mis. s. e. of Garden City, Kansas Nat. Forest, Aug. 1912, *Kellerman* (US). Reno Co.: without stated locality, July 1891, *M. A. Carlton*, 290 (US). Kiowa Co.: Greensburg, Aug. 5, 1890, *B. B. Smyth*, 74 (US). OKLAHOMA. Co. undetermined: Sans Bois Mts., Aug. 21, 1891, *C. S. Sheldon* (NY); tributaries of Washita, 1852, *Marcy's Exped., ex Herb. G. Thurber* (G). Osage Co.: open woods, near Ponca, Aug. 6, 1913, *G. W. Stevens*, 1924 (G). Woodward Co.: sandy soil, Woodward, Aug. 21, 1931, *L. F. Locke*, 11 (US). Payne Co.: Stillwater, July 5, 1896, *E. E. Bogue* (G), 1918,

[1] From notes of a military reconnaissance from Fort Leavenworth in Missouri to San Diego in California, including part of the Arkansas, Del Norte & Gila Rivers, by Lieut. Abert, appendix 6, p. 386, and map, this collection would come from the Bend of the Arkansas R., just where Walnut Creek enters it, in Barton County.

[2] The Report Fremont's Expedition, Washington, 1845, p. 90 of Catalogue of Plants, refers without date to "*L. squarrosa* var. *intermedia* DC. a small form of the plant on the Platte"—which probably refers to these specimens.

F. A. Waugh, 284 (US). DEWEY Co.: dry open ground, plains near Taloga, July 26, 1933, *E. J. Palmer*, 41957 (P). LINCOLN Co.: Fonts, Aug. 28, 1895, *J. W. Blankinship* (G, US). OKLAHOMA Co.: sandy clay, sandstone hills, n. w. of Spencer, Aug. 6, 1939, *U. T. Waterfall*, 1551 (G); sandy soil, 2 mis. w. of Nicoma Park, Aug. 9, 1940, *U. T. Waterfall*, 2343 (G). CADDO Co.: Anadarko, July 17, 1891, *C. S. Sheldon*, 168 (US); without stated locality, June 27, 1903, *A. H. Van Fleet* (US); between Fort Cobb & Fort Arbuckle, 1868, *E. J. Palmer*, 469 (US). ATOKA Co.: gravelly hillside, Stringtown, June 25, 1891, *C. S. Sheldon*, 68 (US). BRYAN Co.: vicinity of Durant, 1931, *W. L. Blain*, 220 (US). TEXAS. DALLAS Co.: sandy soil, near Dallas, June 1882, *J. Reverchon, Herb. Curtiss*, 1171a (G, US); Dallas, July 1874, *J. Reverchon* (G); sandy woods, Dallas, June 1880, *J. Reverchon*, 409 (US); dry uplands, Dallas, Sept. 1877, *J. Reverchon*, 412 (US). TARRANT Co.: in sandy soil, along right of way, T. & P. Rwy., near Handley, July 28, 1913, *A. Ruth*, 404 (US 504842); along T. & P. Rwy., near Polytechnic, July 28, 1913, *A. Ruth*, 404 (US, 910626); meadows, July 1913, *A. Ruth*, 404 (US, 587685); without stated locality, May 1928, *A. Ruth*, 403 (US). WALKER Co.: on blackland prairie, vicinity of Huntsville, July 9–12, 1909, *R. A. Dixon*, 398 (G). COLORADO. Co. undetermined: prairies on the Arkansas[1] below Turkey Creek, Sept. 1847, *A. Fendler*, 298 (G). YUMA Co.: Wray, Aug. 11, 1913, *W. W. Eggleston*, 15534 (G, NY), Aug. 5, 1909, *G. E. Osterhout*, 3991 (NY), July 1–4, 1919, *W. W. Eggleston*, 15173 (US), July 2, 1910, *H. L. Shantz* (US).

The type of *Liatris squarrosa* is the Linnaean specimen, a photograph of which was seen at the Gray Herbarium, as was also one of the specimen back of the reference to the Hortus Cliffortianus. These specimens represent a generally leafy plant, of a branched appearance, with pubescent stems and leaves and squarrose or spreading bracts (var. *floribunda* of Torr. & Gray). From this typical variety, occurring chiefly in Virginia and North and South Carolina, can be distinguished a more slender, fewer- and longer-leaved, generally slightly pubescent plant having fewer heads (1–5) with erect lanceolate rather than squarrose phyllaries, which predominates in the region just north of the Gulf of Mexico, in southern Georgia, Alabama, Mississippi and Louisiana, which we are calling var. *gracilenta*. The wholly glabrous plant with long, acuminate phyllaries is Torrey &

[1] From Plant. Fendl. Mem. Amer. Acad. Ser. 2, iv. 1–116 (1849), this is the place and time of collection of no. 298, and the route followed through September was from Bent's Fort, now in Otero Co., to the Raton Mts. in Las Animas Co.

Gray's var. *compacta*, later reduced by Gray to var. *intermedia*, a variety open to question.

The more common variety of the species in the states just west of the Mississippi is a hirsute plant, described by Rydberg l. c. as *Liatris hirsuta*. It is generally less branching and by reason of its narrower leaves, less foliaceous in appearance than var. *typica*. The distinctly long-ciliate-margined phyllaries, except for a few outermost spreading ones, are tightly appressed with only the long cuspidate tips recurved. Extending from Texas farther westward and northward in the plains states is a slender glabrous variety, without the conspicuous long acuminate bracts of var. *compacta*, but with squarrose callose-margined phyllaries that Rydberg l. c. described as *Liatris glabrata*. In synonymy with this he placed var. *intermedia* of Gray, Synopt. Fl. i^2. 109 (1884) in part, as to description.

It is obvious that much confusion in this species has arisen from the failure properly to place *Liatris intermedia* as described by Lindley (Bot. Reg. t. 948 (1825)) from a plant brought to the Horticultural Society in 1824 by David Douglas and grown from roots collected in Canada by Mr. Goldie who also had pressed specimens of it. From the Journal kept by Douglas during his travels in North America, 1823–27 (Wm. Wesley & Son, 364 pages), it is found that he collected in the vicinity of Amherstburg and Sandwich, now in Essex county, in the southwestern part of the Ontario peninsula. From the examination of Lindley's plate, the plant collected by Douglas strongly resembles *Liatris cylindracea*. Especially do the typical cylindrical younger heads before opening of the flowers place it with *L. cylindracea* rather than *L. squarrosa*, which would show recurved or spreading bracts at the same age. Examination of various herbaria for specimens collected in Ontario has not disclosed any *L. squarrosa* found in the province, though *L. cylindracea* has been collected along the shores of Lake Erie and Lake Huron north to Manitoulin Island, and from the northwest shore of Lake Ontario. The matter was further confused when Hooker, in Flor. Bor.-Amer. i. 306 (1834), listed only *L. scariosa*, *L. punctata* and *L. squarrosa*, giving Canada as habitat for the last species and referring to Mr. Goldie as the collector. In the note under *L. squarrosa* he states: "I fear the *L. intermedia* of the Bot. Reg.

can only be considered a luxuriant state of the present. Mr. Goldie's original specimens in my Herbarium do not at all differ from the true *squarrosa;* and the cultivated individual only exhibits longer flower-stalks". Macoun (Cat. Can. Plants i. 542 (1886)) included *L. squarrosa*, but gave "western Ontario. (*Gray.*)" as the only reference, adding "not noticed by any of the late collectors" and for var. *intermedia* he stated "same situation as the type. (*Gray.*) Not lately collected". Though neither Lindley's plant nor the original herbarium specimen from Canada has been seen, by the plate, description and locality of collection, *L. intermedia* has been placed in the synonymy of *L. cylindracea*. The range of *L. squarrosa* does not include Canada.

Though we believe six varieties of *L. squarrosa* can be distinguished, many intermediates are found, especially where two varieties coincide geographically. So, in the Southern Appalachian region, as in Georgia, where one finds var. *typica* and also var. *gracilenta*, of more southern range, there are more plants of 5–9 heads that are clearly intermediates between the two varieties. In numerous cases specimens show combined characters of both varieties and some of these intergradations have been listed below. Sometimes, specimens of the same number in various herbaria suggest two different varieties, as *R. M. Harper*, no. 273, from Rocky Face Mt., Whitfield Co., Ga., July 21, 1900, of which those at Gray and the New York Botanical Garden resemble var. *typica* and that at Washington, more nearly var. *gracilenta*.

Intermediates between *L. squarrosa* var. *typica* and var. *gracilenta*. NORTH CAROLINA. Iredell Co.: Statesville, July, 1878, *M. E. Hyams* (US). GEORGIA: Whitfield Co.: dry sandy field, s. end of Rocky Face Mt., July 21, 1900, *R. M. Harper*, 273 (G, NY, US). Hart Co.: dry oak woods, 4 mis. s. of Hartwell, Aug. 19, 1927, *K. M. Wiegand & W. E. Manning*, 3178 (G). Gwinnett Co.: banks of Yellow River, July 20, 1893, *J. K. Small* (NY, US). Chattahoochee Co.: Chattahoochee River, Fort Benning Military Reserve, July 7, 1926, *J. O. Andes*, 2910 (NY). Sumter Co.: dry pine barrens s. of Leslie, July 13, 1901, *R. M. Harper*, 1066 (G, NY, US). FLORIDA. Without stated locality: *Chapman ex Torrey Herb.* (NY), *Chapman ex. Herb. Thurber* (G). Liberty Co.: damp woods, on the road from Quincy to Aspalaga and Chattahoochee, *Chapman. ex. Herb. J. A. Lowell* (G). KENTUCKY. Without stated locality: 1842, *C. W. Short* (NY). Co. undetermined:

Green River region, Aug. 21, 1895, *J. N. Rose* (US); Whitley Co.: cliffs of the waterfall, Cumberland Falls, Aug. 21, 1883, *J. D. Smith* (US). ALABAMA. Clay Co.: Elders, July 29, 1896, *C. Mohr* (US). Washington Co.: low pine barrens, June 15, 1895, *C. Mohr* (one plant to left) (US). Mobile Co.: in woods, Spring Hill, Aug. 20, 1897, *B. F. Bush*, 155 (NY, US). MISSISSIPPI. Oktibbeha Co.: Agricultural College, Aug. 11–17, 1896, *C. L. Pollard*, 1318 (plant to right, US).

In Mississippi and Louisiana, var. *gracilenta* is the dominant variety (though again there are some intermediates) and generally it is softly pubescent. However, sometimes it is an almost glabrous, tall slender plant, e. g. *C. L. Pollard*, no. 1082, from Ocean Springs, Jackson Co., Miss. (US), or *Arsène*, no. 12614, from the vicinity of Covington, St. Tammany Parish, La. (US). Yet for the distinctly glabrous, long-foliaceous-bracted plant described by Torrey and Gray l. c. as var. *compacta* from a plant collected by Leavenworth, in "Arkansas or Louisiana" (G, NY), I have found no exact match. The description, "glabrous; leaves crowded, very narrow, heads several, closely sessile, approximate", excludes these Louisiana and Mississippi specimens, since most of them are not wholly glabrous and have heads quite distant, even sometimes pedunculate as seen also in the Drummond specimens (G, NY), and referred to by Hooker[1] (1835). But in a limited range, in Arkansas, I have found glabrous specimens varying from the *compacta* type only in having slightly wider leaves and phyllaries. As these seem very distinctive and nearest to the Leavenworth specimens, I have included them with it in var. *compacta;* the Louisiana and Mississippi plants seem more adequately placed with var. *gracilenta.* The other glabrous variety, with shorter, recurved phyllaries, is the only prevalent one in the western plains-states, and in going from Louisiana westward through Texas, one finds the glabrous form with the shorter phyllaries becoming increasingly abundant. In southeastern Texas, where var. *glabrata* finds its eastern limit, one often sees specimens approaching it in the character of the phyllaries, yet perhaps with softly pubescent stem and sometimes much-branched inflorescence as in *E. J. Palmer*, no. 12802, from

[1] W. J. Hooker—Companion to the Botanical Magazine. Nov. 1835, p. 95, "no. 410 *Liatris squarrosa* Willd.—Covington. β floribus longius pedicellatis involucri squamis appressis vix squarrosis, . . . This is a very remarkable variety but I do not think it can be separated from *L. squarrosa*".

Livingston, Polk Co. (US), or *G. L. Fisher*, no. 261, from Kemah, Galveston Co., Texas (US). These seem understandable as intermediates between the western var. *glabrata* and the southern var. *gracilenta* where the two varieties have met. In specimens from the Mississippi and Alabama region, varying degrees of pubescence are found in combination with a number of modifications of spreading or recurved, callose-margined phyllaries and in intermediacy in the size of the heads. Such phases we believe were described by Alexander as *Laciniaria squarrosa alabamensis*. Though it seems rather difficult to limit this variety with such varying intermediate expressions, we are retaining it here. Further to the north and west, in Kansas and Oklahoma, some specimens are again intermediate between var. *glabrata* and var. *compacta*, as can be seen in the specimens: *M. A. Carleton* no. 290, without locality, Reno Co., Kans. (US), or *U. T. Waterfall*, no. 107 from poor sandy soil, ½ mi. e. of Yale, Payne Co., Okla. (G) or *G. M. Merrill* no. 886, Buffalo Springs, Platt National Park, Murray Co., Okla. (NY). A single specimen, *A. Ruth*, no. 739, in sandy woods, Tarrant Co., Texas (NY), shows a combination of the tawny hairs of var. *hirsuta* with general habit and involucral characters of var. *gracilenta*.

Collections from Kentucky and Tennessee have shown, growing in close populations, quite an assortment of variations. Some less hirsute plants compare well with var. *typica*, others resemble that variety though the phyllaries are shorter and more acute (as those listed for Knox Co., Tenn.). The latter condition was also noted in the few specimens from farther north in Ohio and Illinois and these are sometimes incorrectly found in herbaria under the name var. *intermedia*. Some Tennessee specimens appear to be intermediates between var. *typica* and var. *gracilenta* while others appear to have blended characters of var. *typica* and var. *hirsuta*, abundant to the west across the Mississippi. In Iowa, which is just north of the range of this latter variety, the specimens generally showed very scant pubescence and approach the intergrades between var. *hirsuta* and var. *glabrata*, the latter predominating in the northern and western plains states (S. Dakota, Nebraska, Kansas). Thus there seem to be definite geographic entities which intergrade where their ranges overlap and some of these various probable intergradations have been listed below.

Intermediates between *L. squarrosa* var. *hirsuta* and var. *glabrata*. IOWA. Co. undetermined: central Iowa, *H. H. Babcock* (US). Dickinson Co.: upland prairie, n. of Milford, Aug. 2, 1912, *B. Shimek* (G, US). Osceola Co.: prairies, near Sibley, Sept. 18, 1879, *E. L. Greene* (G); prairie, n. of Ocheyedan mound, Aug. 1912, *B. Shimek* (G, US). Plymouth Co.: Akron, Sept. 1909, *Mrs. E. Bredall* (US). Decatur Co.: prairies, Aug. 25, 1897, *T. J. Fitzpatrick* (NY, US). MISSOURI. Lafayette Co.: dry prairies, Emma, Aug. 10, 1897, *C. H. Demetrio*, 116 (G). Greene Co.: dry woods, Aug. 7, 1895, *J. W. Blankinship* (G). ARKANSAS. Pulaski Co.: roadside by Quarry Country Club, Pulaski Heights, Little Rock, Sept. 23, 1931, *D. Demaree*, 8219 (US). Yell Co.: rocky flats, Mount Nebo State Park, *D. Demaree*, Aug. 16, 1939 (no. 20060), Aug. 30, 1939 (no. 20590) (G). KANSAS. Without stated locality: 1876 *E. A. Popinoe* (US). OKLAHOMA. Creek Co.: Sapulpa, July 30, 1894, *B. F. Bush*, 215 (G, NY, US). Caddo Co.: False Washita, between Fort Cobb & Fort Arbuckle, 1868, *E. Palmer*, 454 (US). Le Flore Co.: in dry creek-channel, base of Rich Mt., Page, Sept. 8, 1913, *G. W. Stevens*, 2691 (G, NY, US); grassy rwy. right of way, Page, July 11, 1914, *O. W. Blakeley*, 1493 (G). Pittsburg Co.: McAlester, July 8, 1894, *C. S. Newhall* (G).

It would seem as though from approximately the Mississippi westward the indifferently somewhat glabrous or hirsute typical *L. squarrosa* became divided into two strains, one distinctly hirsute (var. *hirsuta*), the other distinctly glabrous (var. *glabrata*, and var. *compacta*). The first two of these are easily comprehended as modifications of the squarrose-bracted var. *typica* to the east. As to the third, var. *compacta*, the transition from the condition in var. *typica* to open, erect, somewhat spreading bracts as in var. *gracilenta*, growing somewhat farther south, passed on into the Mississippi-Louisiana region where it stands out against the squarrose var. *glabrata*. It may be merely its persistence further westward in Arkansas that we recognize as var. *compacta*.

While the species *L. squarrosa* shows a range of varieties and intermediates between those varieties, it is nevertheless clearly distinguishable from *L. cylindracea* Michx., which is most closely related to it. The phyllaries of the latter are obtuse to mucronate-tipped and though the outer ones may spread slightly, are mostly appressed, not squarrose. Variation in the shape of the phyllaries from rounded at the apex, as described by Michaux, to more lanceolate ones, was probably responsible for the proposal

of Lindley's *L. intermedia*, but there is complete gradation from one state to the other within *L. cylindracea*.

That *L. squarrosa* hybridizes with other species is known from the reported finding of × *L. Ridgwayi* Standl. (see no. 6) along with plants of it and of *L. pycnostachya* of the *Pycnostachyae* series belonging to the other section *Suprago*. A second hybrid is here described, likewise with a species in the other section, but of the *Scariosae* series.

× Liatris **creditonensis,** hybr. nov. (*L. ligulistylis* × *squarrosa* var. *glabrata*), planta fruticem simulans; caulibus 12 vel plures e cormo ca. 2.5 diametro ca. 50 cm. altis basem versus glabris superne sparse pubescentibus, inflorescentiae rachi pilis albis adpressis strigosa; foliis glabris, superioribus ad bracteas capitula inferiora duplo superantibus capitula superiora aequantes reductis; inflorescentia racemosa; capitulis 40–50-floris subturbinatis 1.6 cm. longis 1.8 cm. latis, phyllariis laxe erectis oblongis apice subarcuato acuto fere omnino herbaceis marginibus scariosis angustis leviter revolutis, exterioribus ca. 5 mm. longis 3 mm. latis, medianis interioribusque ca. 1 cm. longis 5 mm. latis subacutis; corollis ca. 9 mm. longis pallide purpureis, tubo intus glabro, lobis pagina interiore conspicue pilosis; stigmatibus albis; achaeniis 4–5 mm. longis; pappo ca. 6 mm. longo manifeste barbellato.—The type appeared in the garden at Crediton, Huron Co., Ontario, in the summer of 1931 (G).

A single plant of this hybrid appeared in a plot among plants of *L. squarrosa* var. *glabrata*, seeds of which had been collected Oct. 4, 1927, from a high cliff, n. w. of Royal, Antelope Co., Nebraska by Dr. Wernicke, and were received through Prof. R. A. Harper. Growing next at the time were plants of *L. ligulistylis* collected near Erskine, Red Lake Co., Minn. by the writer in 1929. The plant resembled the former species in producing a number of stems with a raceme of ca. 20 uniformly sized heads (without an unusually large terminal one), in the glabrous leaves and their gradual diminution so that they projected as bracts subtending the heads through at least two-thirds of the length of the inflorescence and in the pilosity on the inside of the corolla-lobes. It resembled L. *ligulistylis* in the pubescence of the rachis of the inflorescence, in the many-flowered (40–50) heads, in the involucre of loose erect phyllaries and in the barbellate rather than plumose pappus. It showed intermediate characters in the shape and width of the leaves, in the acute but

broader phyllaries that were almost wholly herbaceous except for the narrow margins but on the whole was a true intermediate between the two species.

As the plant was under cultivation, it was possible to collect seeds and 15 varied seedlings gave proof of their viability. Of the progeny two plants appeared almost identical with the parent and seven others varied only slightly in the width of leaves or phyllaries from it. Of the other seedlings two were very like the parental *L. squarrosa* var. *glabrata:* three were more like it than *L. ligulistylis* in the pointed phyllaries and one other in having narrowly linear leaves. All of the seedlings had hairs within the corolla-lobes, thus showing a much stronger relationship to *L. squarrosa* var. *glabrata.*

Excluded Names and Species

Liatris amplexicaulis Raf. New Fl. N. Amer. iv. 76 (1838)—probably *Trilisa odoratissima.*

Liatris baicalensis Adams in Mem. Soc. Nat. Mosc. v. 115 (1817)—obviously not a *Liatris.*

Liatris bellidifolia Michx. Fl. Bor.-Amer. ii. 92 (1803) = *Carphephorus bellidifolius.*

Liatris brasiliensis Gardn. Hook. London Jour. Bot. v. 461 (1846) = *Leptoclinium brasiliense* Benth. & Hook. Gen. Plant. ii. 244 (1873).

Liatris cordata D. Don ex Royle Illust. Bot. Himal. 247 (1835)—nomen nudum.

Liatris cordata Royle ex C. B. Clarke, Compos. Indicae, 247 (1876) = *Ainsliaea aptera.*

Liatris corymbosa Nutt. Gen. Amer. ii. 132 (1818) = *Carphephorus corymbosus.*

Liatris fruticosa Nutt. Amer. Jour. Sci. v. 299 (1822) = *Garberia fruticosa.*

Liatris lanata Spreng. ex. DC. Prodr. vi. 540 (1837) obviously not a *Liatris.*

Liatris latifolia Don, Prodr. Fl. Nep. 169 (1825) obviously not a *Liatris.*

Liatris lobelioides Wall. ex. C. B. Clarke, Compos. Indicae, 246 (1876) = *Ainsliaea pteropoda.*

Liatris odoratissima Willd. Sp. Pl. iii. 1637 (1803) = *Trilisa odoratissima.*

Liatris oppositifolia Nutt. in Amer. Jour. Sci. v. 299 (1822) = *Eupatorium ivaefolium.*

Liatris paniculata Michx. Fl. Bor. Amer. ii. 93 (1803) = *Trilisa paniculata.*

Liatris squamosa Nutt. Jour. Acad. Nat. Sci. Phil. vii. 73 (1834) = *Carphephorus Pseudo-Liatris.*

Liatris tomentosa Michx. Fl. Bor. Amer. ii. 93 (1803) = *Carphephorus tomentosus.*

Liatris trichotoma Gardn. Hook. London Jour. Bot. vi. 435 (1847) = *Leptoclinium trichotomum* Benth. ex. Baker in Martius Fl. Brasil. vi. (2) 272 (1875–6).

Liatris umbellata Bertol. Misc. Bot. v. 13, t. 4 (1846) = *Vernonia angustifolia.*

Liatris Walteri Ell. Sk. ii. 285 (1821–24) = *Carphephorus tomentosus* var. *Walteri* (Ell.) Fern.

Doubtful Species

Liatris alata (Nelson) K. Sch. Just, Bot. Jahresb. xxxix. 569 (1903)—with "reflected lower leaves, long foliar-bracted spike and alate bracts of the involucre"; the type of the proposed species (Aug. 1895, J. H. Kimmons, Creek Nation, Indian Territory of Oklahoma (Rocky Mt. Herb.) "still represented only by the type number from Oklahoma."[1]

Liatris botrys Raf. New Fl. N. Amer. iv. 76 (1838)—remains a question.

Liatris heterophylla R. Br. in Ait. Hort. Kew. ed. 2 iv. 503 (1812)—Though the type specimen has not been seen, from examination of a photograph of it and the phyllaries of a head of it in a small packet at the Gray Herbarium, this still seems a doubtful and rare species (see discussion no. 17).

Liatris hirsutissima Poir. ex Steudel, Nom. Bot. ed. 2, ii. 40 (1841)—published in synonymy of *Liatris pycnostachya* Michx.

Liatris linaria Raf. Fl. Ludov. 61. (1817)—descr. *Cynarocephale* élégante sans épines Rob. Voy. Louis. iii. 429 (1807). Probably *L. pycnostachya* Michx.

Laciniaria platylepis Small, Bull. Torr. Bot. Club xxvii. 281 (1900); Fl. S. E. U. S. 1174 (1903).—Type specimen of Hale from Louisiana (N. Y.) said not to be like *acidota* because of inner rounded bracts.

Liatris picta Barton ex Greene Herb.—Published in synonymy of *L. spicata* L. in DC. Prodr. v.[1] 130 (1836). The specimen has not been located.[2]

Liatris pumila Lodd. Cab. t. 147 (1817)—Insufficient description to identify; by plate probably *L. spicata* (L.) Willd. *Laciniaria spicata* var. *pumila* Porter, Mem. Torr. Bot. Club v. 314 (1894).

Liatris rigida Raf. New Fl. Amer. iv. 76 (1838)—insufficient description.

[1] By private communication from Prof. A. Nelson.

[2] By private communication from Dr. F. W. Pennell and Mr. C. A. Weatherby.

Laciniaria scariosa var. *trilisioides* Farwell, Rep. Mich. Acad. Sci. xvii. 170–171 (1916)—*Liatris novae-angliae* var. *Nieuwlandii* f. *trilisioides* (Farwell) Shinners, Amer. Mid. Nat. xxix. 31 (1943)—was reported as a sweet-scented form, but the type has not been available.

Laciniaria serotina Greene, Pitt. iv. 315 (1901)—probably an intermediate between *Liatris spicata* (L.) Willd. and *L. pycnostachya* Michx. (See discussion no. 1).

Liatris turbinata Sweet, Hort. Brit. ed. i. 220 (1836) = nomen.

Liatris uniflora Raf. New Fl. Amer. iv. 76 (1836)—by description and region of collection may very well apply to specimens of *L. squarrosa* (L.) Willd. var. *gracilenta*, bearing one head only.

Liatris varia Herb. Banks, Pursh, Fl. ii. 508 (1814)—published in synonymy of *L. heterophylla* R. Br.

McMaster University,
Hamilton, Ontario.

IMPATIENS ROYLEI VERSUS I. GLANDULIFERA

C. A. Weatherby

The handsome Himalayan species of *Impatiens* commonly known as *I. Roylei* has now escaped from cultivation and established itself so successfully at so many localities, from Nova Scotia to Washington and British Columbia, that it has earned a place in our manuals. Its correct name therefore becomes a matter of some importance.

I. Roylei is a substitute name given by Walpers, Repert. i. 475 (1842), to *I. glandulifera* Royle because of *I. glandulifera* Arnott, which Walpers either supposed to be earlier or, at a time when priority was more lightly regarded than at present, thought preferable. Since the title-page of Royle's Illustrations bears the date 1839 and that of the first volume of the Companion to the Botanical Magazine, in which Arnott's species was published, 1835, Walpers may well have thought he was observing strict priority. In any case, his name was adopted by Sir Joseph Hooker in the Flora of British India and the Epitome of the British Indian Species of Impatiens, and by nearly everyone else who has had occasion to refer to the species, though *I. glandulifera* has persisted to some extent in horticultural literature and has been regularly cited as a synonym by L. H. Bailey (e. g. in Hortus Second).

In 1900, however, in a note which seems to have been generally overlooked (Journ. Bot. xxxviii. 87–88), Hiern pointed out that both Royle's work and the Companion were published in parts and that the part of the former which contains *I. glandulifera* was issued more than a year before the part of the Companion in which Arnott's homonym appeared. Sprague in 1933 (Kew Bull. 362–364; 378–390) went into the matter in detail, establishing dates of issue for all parts of both works and confirming Hiern's conclusions. They were further confirmed by Stearn in 1943 (Journ. Arnold Arb. xxiv. 484–487) from a copy of Royle's Illustrations still in the original fascicles which he discovered.

The correct name for the species is, then, *I. glandulifera* Royle. Bibliography (the dates for Royle and Arnott taken from Sprague) is as follows.

Impatiens glandulifera Royle, Ill. Bot. Himalaya Mts. t. 28, fig. 2, plate without analyses of flower, (March, 1834) and p. 151 (Jan., 1835); Lindl. in Bot. Reg. xxvi. t. 22 (1840), as *glanduligera;* Hook. in Bot. Mag. t. 4020 (1843), as *glanduligera;* Sprague in Kew Bull. 1933: 386. Not *I. glandulifera* Arn. in Comp. Bot. Mag. i. 322 (June, 1836).—*I. Roylei* Walp. Repert. i. 475 (1842); Hook. f. & Thomps. in Journ. Linn. Soc. iv. 127 (1860); Hook. f. Fl. Brit. India, i. 468 (1872) and in Rec. Bot. Survey India, iv. 7 (1904); E. Loew in Engl. Bot. Jahrb. xiv. 167, t. 1, 2 (1892); Bailey, Standard Cycl. Hort. 1644, fig. 1954 (1915); Toppin in Kew Bull. 1920: 347.

The flowers of *I. glandulifera* are typically, except for the short green spur, of a uniform dark magenta-red without spots, and, with a single exception, all the American material I have seen is of this typical form, or at least indistinguishable in the dried state. At St. John, New Brunswick, however, where the species crowds several small areas of moist waste ground, many individuals have pale pink corollas with brownish or reddish spots on the sac, yellowish spur and a narrow green band running along the upper side of the sac to the spur. This is apparently *I. Roylei* var. *pallidiflora* Hook. f. in Bot. Mag. t. 7647 (1899). Since Hooker gives no differential characters except color of flower and size of plant for his variety and since the St. John material seems to show no others, this may appropriately be treated as a color-form and, at some risk of repeating a combination already made in recent European literature, be called

I. GLANDULIFERA Royle, forma **pallidiflora** (Hook. f.) n. comb. *I. Roylei* var. *pallidiflora* Hook. f. in Bot. Mag. t. 7647 (1899).

Hegi, Ill. Fl. Mittel-Eur. v. 314 (1924), describes a pure albino as *I. Roylei* forma *albida* Hort. This is very likely the same as *I. Roylei* var. *candida* (Lindl.) Hook. f. Fl. Brit. India, i. 469 (1872); *I. candida* Lindl. in Bot. Reg. xxvi. Misc. Not. 85 (1840) and xxvii. t. 20 (1841). I saw no pure white flowers at St. John.[1]

GRAY HERBARIUM.

[1] Since the above was in type I have, through the kindness of Prof. G. N. Jones, seen further specimens of two collections by him—Mukilteo, Snohomish Co., Washington, Aug. 4, 1937, no. 10545 and Port Moody, British Columbia, Aug. 14, 1935, s. n. These show that the plants at both the above stations were of forma *pallidiflora*. I have seen no other western material.

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ERRATA

Page 14, line 28; *for* 1006 *read* 1000.
Page 38, line 5; *for* transfer *read* transfers.
Page 44, line 23; *for* aments, with *read* aments with.
Page 142, line 1; *for* S. U. Se. *read* Se. U. S.
Page 173, line 23; *for* Willd. *read* Michx.
Page 254, line 4; *for* 16028 *read* 10028.
Page 262, line 31; *for* Jones *read* Jonas.

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